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Faculty of Medicine
GIT Module
Parasitology lecture

Parasites affecting GIT

Cestodes 1

By the end of this section ,the student should:

- Identify the characteristic of morphology ***of D. latum***
- Identify the characteristic of morphology ***of Taenia saginata***
- Identify the characteristic of morphology ***of Taenia solium***

Cestodes

Classification of Cestodes

- Systemic Classification
  - Cestodes belong to -
    - Phylum—Platyhelminths
    - Class- Cestoidea
    - Subclass- Eucestoda

Order	Family	Genus
Pseudophyllidea	Diphyllobothriidae	*Diphyllobothrium* *Spirometra*
Cyclophyllidea	Taeniidae	*Taenia* *Echinococcus*
	Hymenolepididae	*Hymenolepis*
	Dipylidiidae	*Dipylidium*

Difference b/n a Pseudophyllidean Cestode and a Cyclophyllidean Cestode

	PSEUDOPHYLLIDEAN CESTODE	CYCLOPHYLLIDEAN CESTODE
Head	Bears 2 longitudinal slit- like grooves- called **bothria**	Bears 4 cup-like muscular suckers (*acetabula). In T. solium* and *H. nana,* scolex has a beak like apical protrusion called as **rostellum**
Uterus	No branching; the convoluted uterine tube assume the form of a rosette.	Branching may or may not be present.
Uterine pore	Present	Absent
Common genital pore	Ventral in the midline.	Lateral
Eggs	Operculated; give rise to ciliated larvae.	Non operculated; do not give rise to ciliated larvae.
Larval form	Solid	Contains bladder like sac

Diphyllobothrium latum

(Fish tape-worm)

- **Disease:** Diphyllobothriasis;

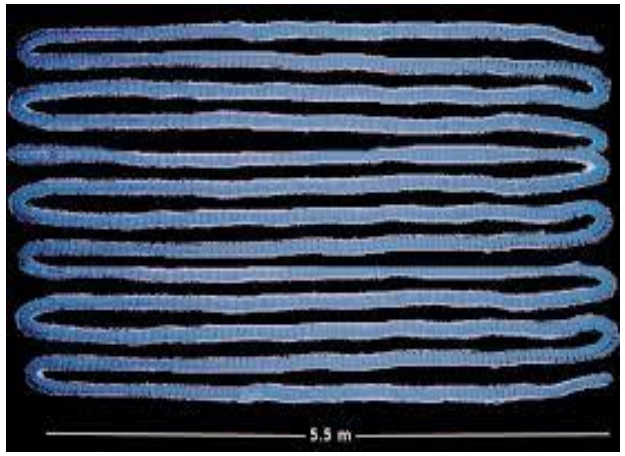
  fish tape-worm infection;

  broad tapeworm infection.

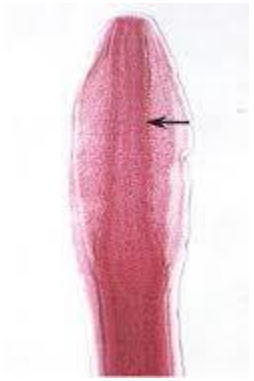
- **Geographical distribution:**

- European countries and foci in America and Russia.

Morphology



- **Adult:**
  - 3-10 meters in length
  - have more than 300 proglottids
  - ivory or grayish-yellow in color.



- The scolex
  - is small
  - almond-shaped and
  - has two deep grooves (bothria).

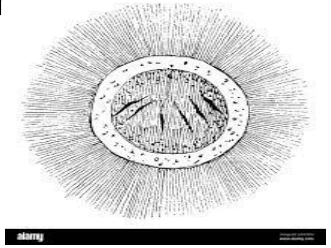
- **Egg:**

70x45μm, oval,

immature operculated and has

thick shell.

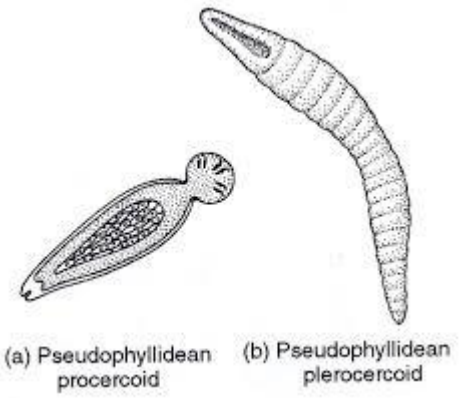
- **Coracidium:** This is a spherical, 6-hooked embryo (onchosphere) enclosed in a ciliated embryophore



- **Procercoid:** This is a solid elongated organism about 0.5mm with a spherical caudal end having 6-hooks.

- **Plerocercoid:** solid elongated organism

1-2cm with invaginated anterior end.



DPDx

Diphyllobothriid Tapeworms

CDC

5 Infected crustacean ingested by second intermediate host, usually small fish.

Procercoid larva released from crustacean develops into plerocercoid larva.

6 Predator fish (paratenic host) eats small fish; plerocercoid invades tissue.

4 Procercoid larvae develop in body cavity of crustaceans.

7 Definitive host ingests plerocercoids in infected fish.

Many fish-eating mammals and birds are definitive hosts.

Scolex

Dibothriocephalus spp. *Adenocephalus* spp.

8 Adults in small intestine

3 Coracidia hatch from eggs and are ingested by the first intermediate host, crustaceans.

2 Eggs embryonate in water.

1 Unembryonated eggs passed in feces of definitive host.

Infective stage

Diagnostic stage

Life cycle

- Habitat: Small intestine (The ileum and sometimes the jejunum).
- Definitive host: Man and fish eating animals.
- Intermediate host:

  1) First intermediate host: Cyclops (water flea).

  2) Second intermediate host: Fresh water fish. e.g. Salmon.

- Infective stage: Plerocercoid larva.
- Mode of infection: Ingestion of raw or under cooked fish.

Pathology

- There is little or even no pathological lesions.
- The non-specific symptoms are usually due to:

-the absorption of the **toxic secretions** and products of degenerating proglottids

- or **mucosal irritation** caused by the worm.

- The adult worm absorbs large quantities of **vitamin B12** and interferes with ileal **B 12 absorption.**
- **Megaloblastic anemia** resembling **pernicious anemia** (macrocytic hyperchromic anemia) in **2% of patients .**

Clinical picture

- Hunger pain, loss of weight
- epigastric fullness,
- loss of appetite,
- anorexia,
- nausea, vomiting, and diarrhea
- Macrocytic hyperchromic anemia with thrombocytopenia and mild leukopenia.

• Diagnosis

1.History

Live in endemic area,

raw fish eating,

2.A pernicious type of anemia are diagnostic.

3. **Finding the operculated eggs or proglottids in the feces.**

• Prevention

1.Health education about the danger of eating raw or imperfectly cooked fish.

2.Sanitary sewage disposal.

3.Avoid the sale of fish from heavily infested lakes

4.Freezing at –10°C for 24 hours

5. Thorough cooking for at least 10 minutes at 50°C 6.Proper drying and pickling of the fish will kill the larvae.

•Treatment

- Praziquantel or niclosamide.

Taenia saginata

(Beef Tapeworm)

- **Disease:** beef tapeworm infection (Intestinal taeniasis)

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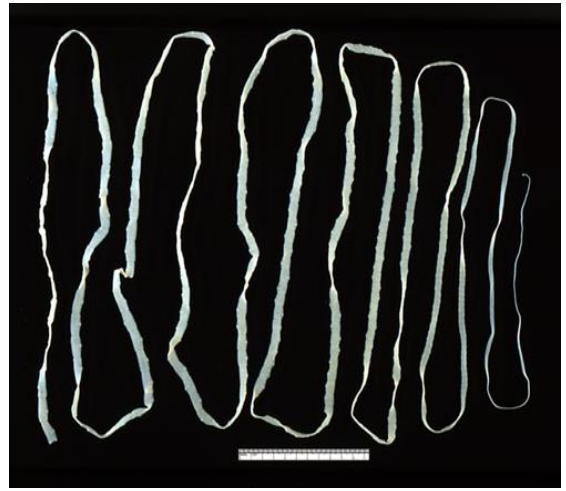
- **Geographical distribution:** Cosmopolitan.

Morphology



- **Adult:** 4 -10 meters in length

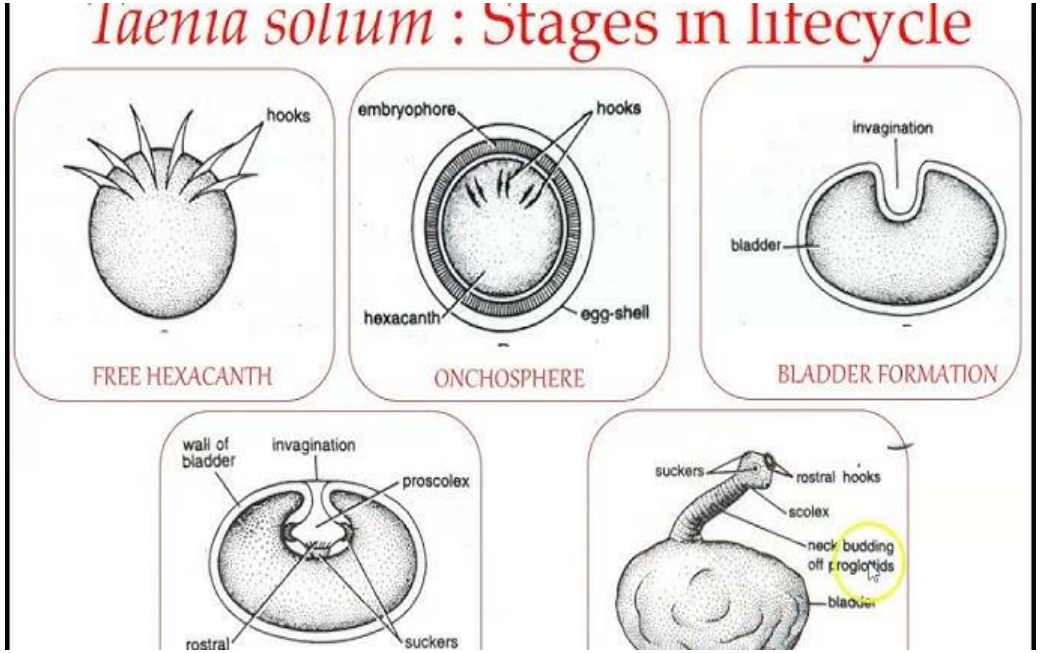
Has 1000-2000 proglottids (segments).

The scolex has four suckers.

- **Egg:**

- yellowish-brown,
- 30x40µm,
- has thick radially striated shell
- contains mature hexacanth embryo (onchosphere).

- **Cysticercus:** the larval stage of *Taenia spp*,
- bladder like, lined with a germinal layer
- enclosing a cavity containing fluid.
- An invaginated scolex with four suckers.



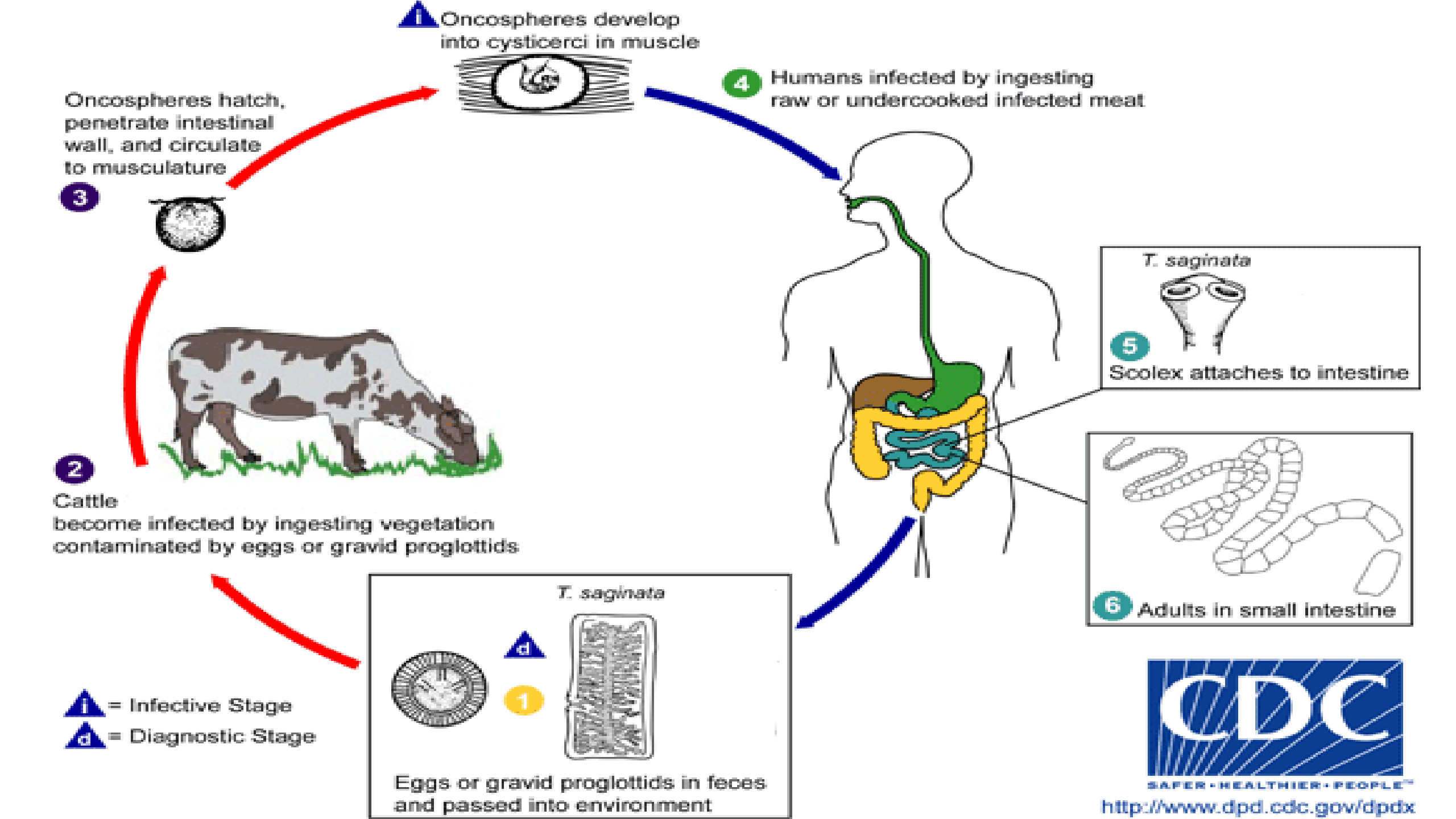
- **Life cycle**

- **Habitat:** In the upper part of the jejunum.
- **Definitive host:** Human.
- **Intermediate host:** Cattle.
- **Infective stage:** Cysticercus bovis.
- **Mode of infection:** Eating raw, or imperfectly cooked beef containing cysticerci bovis.

- A mature worm develops in 8-10 weeks.

- In human small intestine, the proglottids usually detach singly, migrate through the anus by their movements

or may be carried out in the stool.


Oncospheres develop into cysticerci in muscle
Humans infected by ingesting raw or undercooked infected meat
Oncospheres hatch, penetrate intestinal wall, and circulate to musculature
3
T. saginata
5
Scolex attaches to intestine
2
Cattle become infected by ingesting vegetation contaminated by eggs or gravid proglottids
6
Adults in small intestine
T. saginata
d
1
Eggs or gravid proglottids in feces and passed into environment
i = Infective Stage
d = Diagnostic Stage
CDC
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http://www.dpd.cdc.gov/dpdx

Pathology

- Adult taenia is weakly immunogenic and may only induce a moderate eosinophilia.
- Minor local inflammation due to attachment of the scolex to the mucosa

• Clinical picture

- Most infected individuals are asymptomatic.

- Mild gastrointestinal symptoms may develop, including:

  epigastric pain,

  abdominal discomfort,

  vertigo, nausea, vomiting,

  diarrhea, increase or loss of appetite.

- Moderate eosinophilia.

Diagnosis

- Stool examination

for the recovery of *Taenia* eggs and gravid proglottids.

Prevention

- Removal of the sources of infection by treating infected individuals.
- prevention of contamination of soil with human feces.

- Inspection of beef for cysticerci bovis.
- Thorough cooking of beef by heating above 57°C and

- Freezing at –10°C for 5 days
- pickling in 25% salt solution for 5 days destroy cysticerci.

Treatment

1. **Niclosamide (Yomesan):** This is the drug of choice.

2. **Praziquantel** as alternative drug.

Taenia solium

(Pork Tapeworm)

- *Taenia solium* parasite is very similar to *T. saginata,* except some morphological and biological aspects.

- **Disease:** - Pork tapeworm infection (intestinal taeniasis)
  - occasionally cysticercosis.

Geographical distribution:

- Cosmopolitan, where pigs are eaten .

• Morphology:

Adult : 2-4 meters in length and has 800-1000 segments.

The scolex is globular, has four cup-shaped suckers and a rostellum with a double crown of hooks.

Egg: as T. saginata

•Life cycle

- **Definitive host:** Human.
- **Intermediate host:** Pigs and man.
- **Infective stage:**
- Cysticercus cellulosae→→→intestinal taeniasis
- Egg →→→ cysticercosis

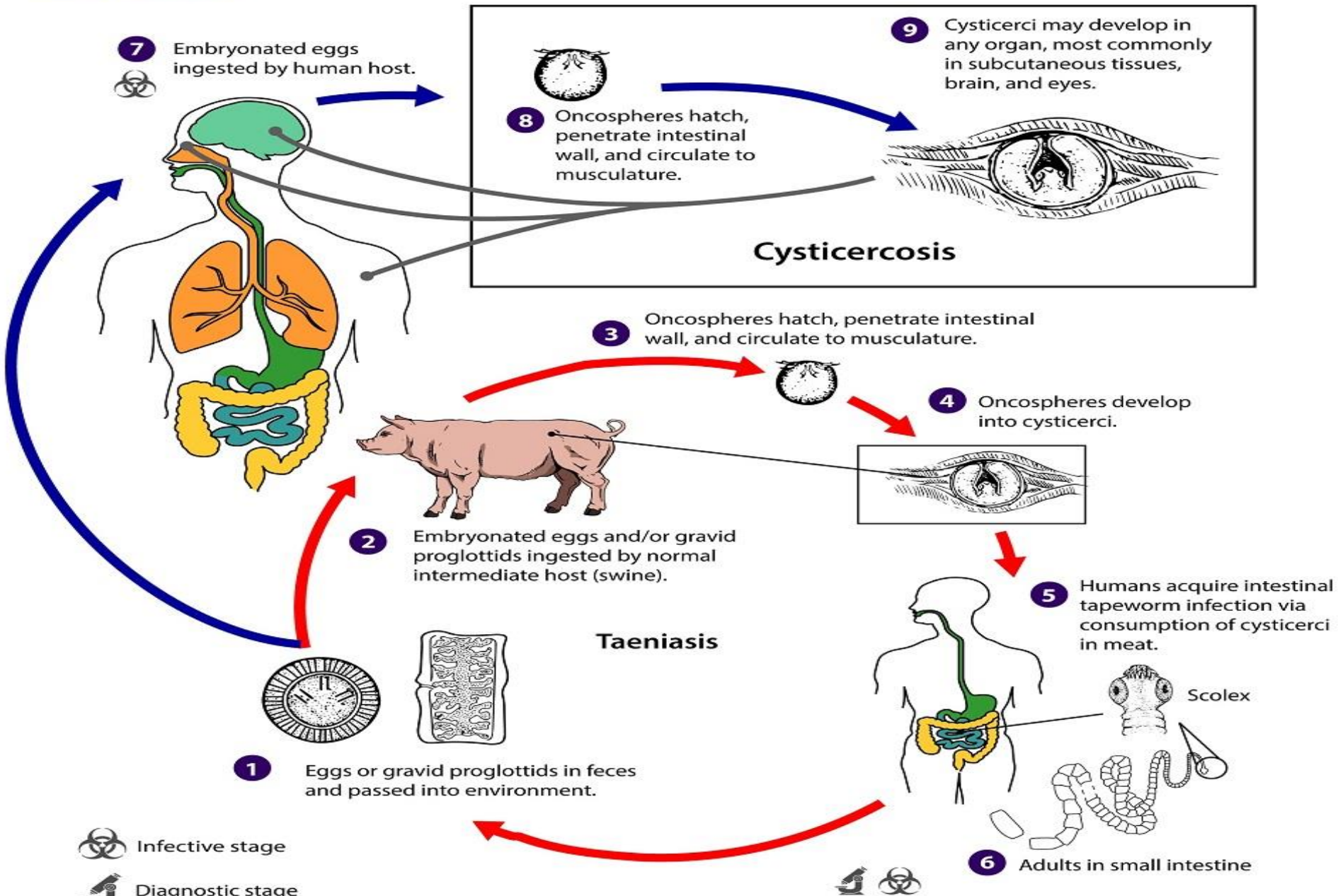
- man may act as:

dead-end intermediate host after ingestion of *T. solium* eggs, causing a disease known as cysticercosis.

Taenia solium

CDC

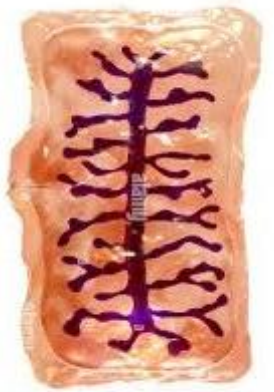
DPDx


7 Embryonated eggs ingested by human host.
8 Oncospheres hatch, penetrate intestinal wall, and circulate to musculature.
9 Cysticerci may develop in any organ, most commonly in subcutaneous tissues, brain, and eyes.
Cysticercosis
3 Oncospheres hatch, penetrate intestinal wall, and circulate to musculature.
4 Oncospheres develop into cysticerci.
2 Embryonated eggs and/or gravid proglottids ingested by normal intermediate host (swine).
Taeniasis
5 Humans acquire intestinal tapeworm infection via consumption of cysticerci in meat.
Scolex
1 Eggs or gravid proglottids in feces and passed into environment.
6 Adults in small intestine
Infective stage
Diagnostic stage

Diagnosis

- **Stool examination**

for the recovery of *Taenia* eggs and gravid proglottids.



Treatment:

- Niclosamide
- Precautions:

- a saline purge is given a few hours after treatment to expel the eggs out rapidly.

to avoid internal auto infection as niclosamide cause disintegration of the gravid segment and releasing of viable eggs in the intestine.

Thank
you